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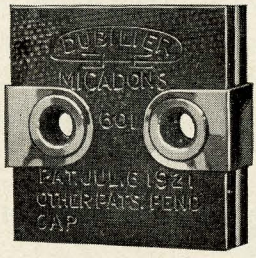
DUBILIER CONDENSER & RADIO CORPORATION

NEW YORK CITY

BULLETIN R-101 DUBILIER TRADE MARK JUNE 1922

DUBILIER MICADONS

Type 601



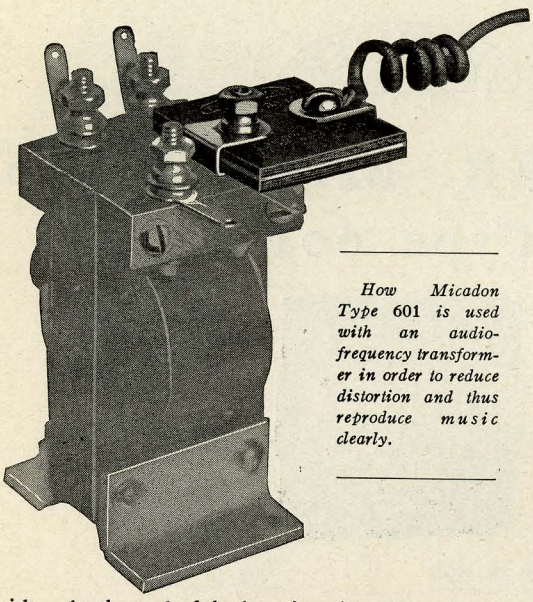
Capacity in mfds	*List Prices*
.0001 mfd	·35
.00025 "	·35
.0005 "	·35
.001 "	·40
.002 "	·40
.0025 "	·40

EVERY radio receiving set should have one or more condensers—a reservoir in which the radio energy received by the antenna circuit is momentarily stored before it is passed on to the devices that detect, amplify and convert the energy received into music or speech. What we commonly call a "storage battery" does not store electricity at all; it is simply a combination of chemical elements so affected during the process called "charging" that a current is generated when they are properly connected. The only device ever invented that actually stores electricity is the condenser.

In its modern form—a form for which the Dubilier Condenser and Radio Corporation is largely responsible—the condenser consists of a large

number of exceedingly thin sheets of metal foil separated by a thin mica film, called the "dielectric." In the process of charging, static electrical pressure accumulates between the metal sheets. When the pressure becomes so great that it can no longer be retained, the electricity is discharged.

This action is of an alternating character. The electricity, in charging, collects on the plates (the thin sheets of metal) for one half of the cycle. Then follows a discharge in the opposite direction for the other half of the cycle. Immediately thereafter, there is another discharge, followed by recharging. Each discharge and charge is weaker than that preceding it, so that whatever electricity the condenser has stored is spent.



How Micadon Type 601 is used with an audio-frequency transformer in order to reduce distortion and thus reproduce music clearly.

The whole process is similar to that which we have often observed in a freely swinging pendulum. Tap the pendulum. It swings to one side. At the end of the beat it swings back, but not quite to the starting point. On the next beat it does not travel quite so far as before. Each beat is less in amplitude than its predecessor. So, the swinging pendulum gradually comes to rest, and so a condenser loses all its stored electricity in successively weaker charges and discharges.

This process occurs with flash-like rapidity. In radio we deal with oscillations of current in the antenna that vary in number from ten thousand to three million per second, and it is with this frequency that a condenser is charged and discharged.

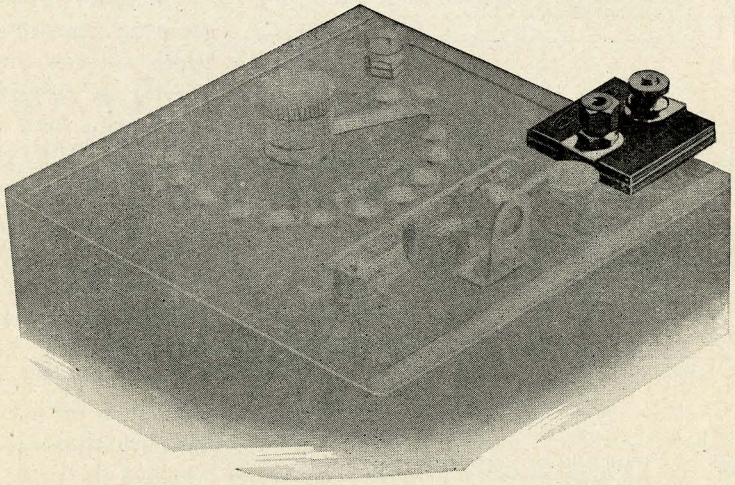
Every condenser has "capacity." The term explains itself; for a condenser can hold so much electricity and no more. The metal sheets of the condenser have a certain amount of surface. Obviously, it takes a longer time with the same electrical pressure to charge a large surface than a small surface, just as it takes a longer time to paint a large than a small board, the rate at which the paint is applied to each square inch of board surface being constant.

THE CAPACITY MUST BE CONSTANT

As the condenser is charged and discharged thousands and even millions of times in a second the sheets of metal, under the action of the electrical pressure, dilate and contract. This springing back and forth is a characteristic of poor condensers. Because of the dilation and contraction the capacity is not constant. This is a defect which has serious consequences in radio. Much of the whistling and howling of vacuum tubes is directly caused by fluctuations in capacity. These fluctuations must be avoided if broadcasted music and speech are to be thoroughly enjoyed. Test a condenser before buying it in order to ascertain if it is likely to cause whistling and howling. Simply squeeze it between the fingers. If it feels soft, if it yields, it should be rejected. Dubilier condensers always meet this test.

Dubilier condensers have always been known for their *permanent* capacity. Ninety-five percent of the Governments and commercial stations of the world have officially adopted and used Dubilier Transmitting Condensers for years. It is probable that the broadcasting station to which you listen with such pleasure is equipped with Dubilier condensers.

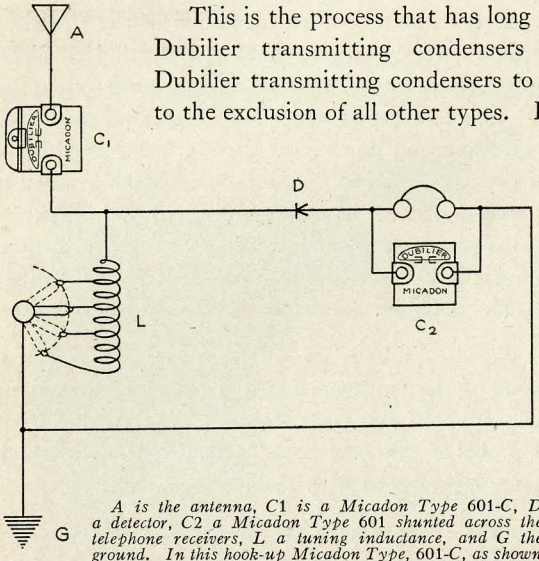
Dubilier condensers owe their efficiency to the fact that in the first place *mica* is used as the dielectric between the thin metal sheets and that, in the second place, a special compound takes the place of the air that remains between the elements. The condenser elements are then pressed to form a



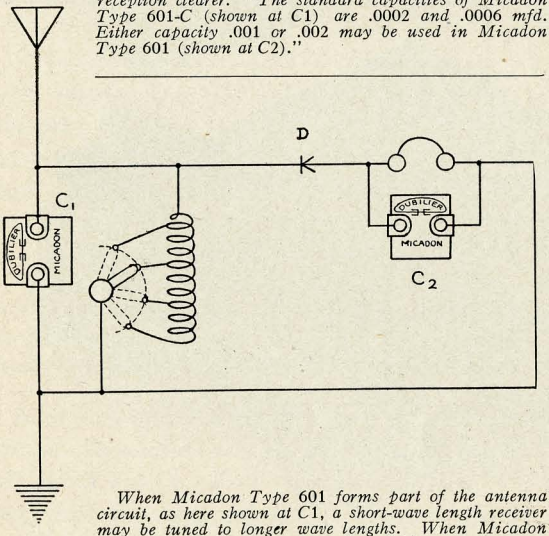
With the usual forms of crystal detector, designed for short-wave lengths, reception is difficult because the antenna receives waves which are too long. To overcome this difficulty Micadon Type 601 *can be mounted as here shown, so that the receiver can detect short-wave lengths effectively. A short-wave length receiver cannot be used with a long-wave antenna unless a series antenna condenser is used in this manner. The Micadon Type* 601 *is connected with the antenna post of the receiver.*

solid mass. It is impossible for the sheets to dilate and contract, and hence there can be no fluctuations in capacity.

This is the process that has long been followed in making Dubilier transmitting condensers and that has caused Dubilier transmitting condensers to be so generally adopted to the exclusion of all other types. Exactly the same process is followed in making Dubilier receiving Micadons, which have been introduced to meet the demand for condensers of permanent capacity and to avoid those tube noises which may be directly traced to rapid variations in capacities.



A is the antenna, C1 is a Micadon Type 601-C, D a detector, C2 a Micadon Type 601 shunted across the telephone receivers, L a tuning inductance, and G the ground. In this hook-up Micadon Type, 601-C, as shown at C1, shortens the wave length of a long-wave antenna, so that a short-wave receiver may be more efficiently tuned. Micadon Type 601, as shown shunted across the telephone receivers, reduces distortion and, therefore, makes reception clearer. "The standard capacities of Micadon Type 601-C (shown at C1) are .0002 and .0006 mfd. Either capacity .001 or .002 may be used in Micadon Type 601 (shown at C2)."



When Micadon Type 601 forms part of the antenna circuit, as here shown at C1, a short-wave length receiver may be tuned to longer wave lengths. When Micadon Type 601 is shunted across the telephone receivers, as here shown at C2, distortion is reduced so that signals are received clearly. With reference to Micadon Type 601 (shown at C2) it is suggested that .00025 or .0005 mfd. capacities be used.

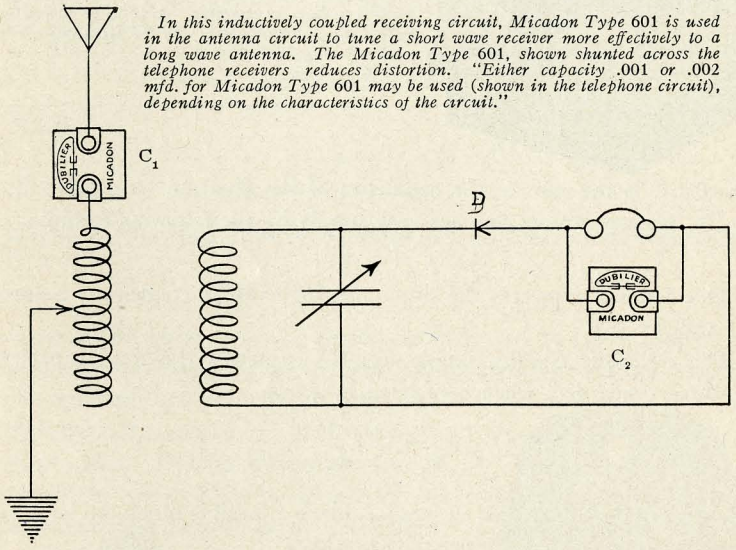
DUBILIER MICADONS FOR RECEPTIONS

These new Dubilier receiving condensers, which are now incorporated in thousands of receiving sets, are marked DUBILIER and are called "Micadons" in order to make it as easy as possible for those interested in perfect broadcasting to recognize them. The accompanying illustrations show the manner in which Micadons are "hooked up."

Dubilier Micadons are manufactured according to the same

principles that have made the high-voltage Dubilier power-condensers so conspicuously successful. Only carefully selected metal foil and carefully tested India mica are used. Each condenser unit is compressed and impregnated by a special process which is fully protected by basic patents. Care is taken that the pressure is equally distributed over the entire active surface. Squeeze the Dubilier Micadon between the fingers, and it is impossible to make any impression upon it. The elements do not yield—proof that they cannot dilate and contract.

The special compound, which is just as much an essential part of a Dubilier receiving Micadon as it is of the larger Dubilier high-voltage



In this inductively coupled receiving circuit, Micadon Type 601 is used in the antenna circuit to tune a short wave receiver more effectively to a long wave antenna. The Micadon Type 601, shown shunted across the telephone receivers reduces distortion. "Either capacity .001 or .002 mfd. for Micadon Type 601 may be used (shown in the telephone circuit), depending on the characteristics of the circuit."

transmitting condenser, prevents moisture from entering and therefore from impairing the electrical efficiency.

Dubilier Micadons are severely tested before they reach the consumer. They must withstand a final test of one thousand volts (alternating current) although the average breakdown voltage is three thousand.

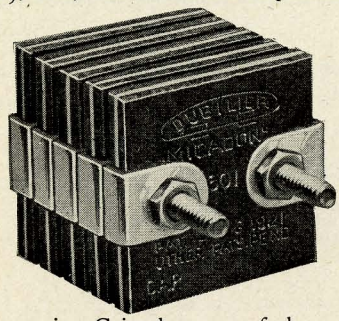
Because it is thus made, a Dubilier Micadon will maintain an absolutely fixed capacity under all conditions of service and will last indefinitely. Some other condensers, on the other hand, burn out quickly.

Condensers are subject to what is called "leakage." When a condenser is charged and is allowed to stand, its charge is slowly dissipated. This may be a matter of minutes, hours or days. How rapidly a condenser loses its charge by leakage is one test of its efficiency. Dubilier Micadons have very low leakage losses. The leakage losses of ordinary condensers are great.

HOW TO CALCULATE CAPACITY

Condensers may be connected in parallel or in series. In either case it is easy to calculate the capacity of a number of condensers.

Suppose that we have to calculate the total capacity C of a number of condensers in parallel, and suppose that we designate by the letters c_1, c_2, c_3, etc., the individual capacities of separate condensers. Since the total



Micadons Type 601 *are here shown connected in parallel to increase capacity. A screw or stud is passed through the eyelet terminals and the Micadons are locked together with nuts.*

capacity C is the sum of the capacities of the separate condensers c_1, c_2, c_3, etc., we can express the fact very simply by the following formula:

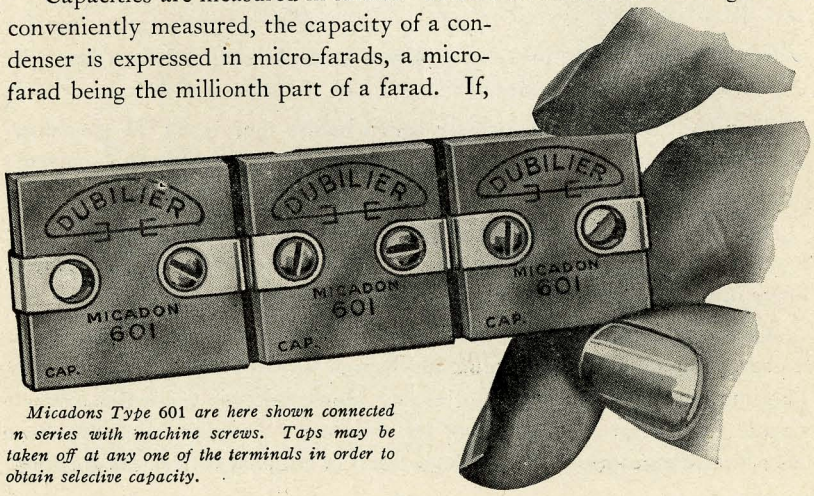
$$C = c_1 + c_2 + c_3$$

This formula expresses the total capacity of three condensers connected in parallel.

The following equally simple formula expresses the total capacity of the three condensers when connected in series:

$$\frac{1}{C} = \frac{1}{c_1} + \frac{1}{c_2} + \frac{1}{c_3}$$

Capacities are measured in farads. Since a farad is much too large to be conveniently measured, the capacity of a condenser is expressed in micro-farads, a micro-farad being the millionth part of a farad. If,



Micadons Type 601 *are here shown connected n series with machine screws. Taps may be taken off at any one of the terminals in order to obtain selective capacity.*

then, the separate condensers c_1, c_2 and c_3 each have a capacity .001 microfarad (usually abbreviated to "mfd") we have only to make the proper substitutions in our two formulas in order to arrive at the total capacity. In other words formula 1 will read as follows:

$$C=.001+.001+.001$$

Any capacity from .000025 to .01 mfd can be created by connecting in parallel or series as the case may be, any of the properly selected capacities listed on page 1.

In other words the total capacity C is .003 mfd when the condensers are connected in parallel.

Similarly, the second formula becomes

$$\frac{1}{C}=\frac{1}{.001}+\frac{1}{.001}+\frac{1}{.001}$$

Hence,

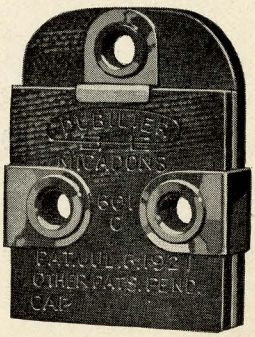
$$\frac{1}{C}=\frac{3}{.001} \text{ or } 3C=.001 \text{ or } C=.00033$$

Therefore, the total capacity C when the condensers are connected in series is

.00033 mfd

Dubilier Micadons are so designed that they can be easily handled and coupled together even by those who have no electrical knowledge whatever. Eyelet terminals are provided to make connecting easy. By means of a machine screw or two, several Dubilier Micadons can be connected in parallel or in series, as the accompanying illustrations show. A soldered connection may also be made to the thin copper band with which the Micadon is edged.

When properly connected Dubilier Micadons are suitable for higher voltages and are therefore serviceable for small, short-range, amateur transmitting stations.

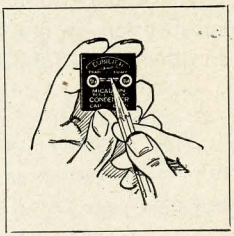


This is Micadon Type 601-C. It has three terminals, which permit the selection of any one of three capacities for use between the antenna and receiver when connected for one capacity in the top diagram, as shown on page 4. The standard capacities are .0002 and .0006 mfd. Micadon Type 601-C of special capacities can also be made.

DUBILIER MICADONS TYPE 601-C

Dubilier Micadon, type 601-C is a special model (shown in illustration above) which sells at the list price of $.60.

TO MAKE AN ADJUSTED GRID-LEAK



An adjusted grid-leak resistance can be quickly made. Scrape or sandpaper the surface of a Dubilier Micadon between the terminals. Next make a leakage path by rubbing the point of a soft lead pencil across the roughened surface between the terminals. Since it is difficult for the pencil to deposit graphite up to the metal terminal, it is well to complete the leakage path with a little India ink to fill the gap between the lead pencil line and the metal terminals. If too much graphite has been deposited, erase some of it; if too little, rub the point of the lead pencil again on the surface. Thus an adjusted grid-leak can be made, and an adjusted grid-leak is highly essential in obtaining the best results.

DUBILIER
TRADE MARK

DUBILIER CONDENSER & RADIO CORPORATION

New York City

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